

Minerals Management Service
P. O. Box 2550
Billings, Montana 59103

July 22, 1982

Memorandum

To: Tim MacGillvray, Economic Evaluation Section

Through: District Supervisor for Resource Evaluation, Billings

From: Geologist

Subject: Redelineation of Northwest Otter Creek Tract

Northwest Otter Creek coal tract has been redelineated for resale in fall of 1982. Due to a failure to receive land owner consent, T. 4 S., R. 45 E., sec. 4, SW $\frac{1}{4}$ SW $\frac{1}{4}$ has been removed from the tract as previously offered for sale. This removes 40 acres from the tract. The actual coal acreage is only 1.5 acres. With a coal thickness of 64 feet, this totals 170,000 tons of coal removed. The new figure for recoverable Federal tonnage in the tract (at 90 percent recovery) is 138.4×10^6 tons. The new federal acreage is 1,271 acres. The average stripping ratio is unchanged.

John M. Spencer

cc: Project Leader, Powder River
Bill Frey, BLM Montana State Office
Powder River File
Chron

JMSpencer:iwt:7/22/82

TRACT SUMMARY REPORT

Minerals Management Service, North Central Region
Billings District
Billings, Montana

Date: November 1, 1982

TRACT DESCRIPTION

Tract Name: Northwest Otter Creek No.:

Coal Region: Northern Powder River Basin

State: Montana County: Rosebud, Powder River

BLM Resource Area and Planning Unit: Powder River

USGS Quadrangle Maps: Willow Crossing, Ashland, King Mountain

Legal Description: See Attachment A and Attachment B (Tract Location Map)

Known Recoverable Coal Resource Area (KRCRA): Northern Powder River

Tract Acres (by BLM)

Federal Uncommitted:

Federal Committed:

State:

Private (Fee):

Total Tract:

Approximate Acres Underlain by Coal:

Federal Uncommitted: 953

Federal Committed: 0

State: 640

Private(Fee): 2006

Total Tract: 3599

Estimated In-Place Coal Tonnage:

Federal Uncommitted: 106.2 MMT

Federal Committed: 0 MMT

State: 68.0 MMT

Private (Fee): 224.0 MMT

Total Tract: 398.2 MMT

Estimated Recoverable Coal Tonnage:

Federal Uncommitted: 89.2 MMT

Federal Committed: 0

State: 55.8 MMT

Private (Fee): 172.6 MMT

Total Tract: 317.6 MMT

ENTITIES EXPRESSING INTEREST

Meridian Land and Minerals Co.
 Cities Service Co.
 Chevron Resources Co.

COAL RESOURCE CLASS DESIGNATION

CLASS 1: Good

Confidence in resource estimates is good because the surface areas of category "A" and "B" resources cover two-thirds or more of the total surface area of the tract

CLASS 2: Moderate

Confidence in resource estimates is moderate because the surface areas of category "A" and "B" resources cover one-third to two-thirds of the total surface area of the tract.

CLASS 3: Poor

Confidence in resource estimates is poor because the surface areas of category "A" and "B" resources cover one-third or less of the total surface area of the tract.

POTENTIAL FOR DEVELOPMENT OF TOTAL TRACT

EVALUATION FACTORS	CLASS 1	CLASS 2	CLASS 3
Coal Resources	X		
Coal Quality	X		
Transportation			X
Minability		X	
Marketability		X	
Overall Class		X	

See Attachment C.

COAL RESOURCE CATEGORY DEFINITIONS

CATEGORY "A" RESOURCES

Resource quantity is estimated from data sources that are adequately spaced to assume, with a high degree of confidence, continuity between data points. The geologic character of the area is well defined. The resources for the Mud Springs tract in this category also meet the demonstrated reserves category of USGS Bulletin 1450-B.

CATEGORY "B" RESOURCES

Resource quantity is based on an assumption of continuity between data points with a lower confidence level than that of category "A" resources. The geologic character of the area is not as well defined as category "A" resources.

CATEGORY "C" RESOURCES

Resource quantity is based on an assumption of what can reasonably be expected to exist in the same producing region under analogous geologic conditions with a lower confidence level than that of either category "A" or "B".

POTENTIAL FOR DEVELOPMENT OF TOTAL TRACT

COAL TONNAGE OF NORTHWEST OTTER CREEK TRACT

Coal Bed	Average Thickness	<u>Resources (million short tons)</u>		
		Category A	Category B	Category C
Knobloch	62	398.2	---	---

Coal tonnages were calculated using the accepted unit weight of 1770 tons per acre-foot for subbituminous coal.

Federal, State, and privately held coal in this tract is all under Category "A". Only the Knobloch bed is considered here. Tonnages are given on page 1 of this report.

COAL QUALITY
TOTAL TRACT - NORTHWEST OTTER CREEK

(Values in percentage, except BTU)

Coal bed	Number of samples	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	BTU/lb
Knobloch	2	27.76	29.48	37.41	5.36	0.14	8,506
*Knobloch	3	24.39	32.04	39.51	4.05	.153	9,192
*Knobloch	7	27.36	29.65	38.33	4.64	.186	8,663

*Sample area is from 1 to 3 miles outside of Tract boundary.

GEOLOGY OF THE NORTHWEST OTTER CREEK LMST

The Northwest Otter Creek Tract lies near the northern margin of the Powder River Basin. The surrounding rocks are of the Paleocene Fort Union Formation and Eocene Wasatch Formation. The Tongue River Member of the Fort Union contains the most significant coal in the area.

Rock strata comprising the Tongue River Member in the area are essentially flat-lying, but do exhibit a regional southward dip of less than one degree.

The Tongue River Formation contains at least six persistent coal beds 5 to 35 feet thick and several other thin, less persistent, beds. The Knobloch bed is present within the tract boundary and has an average thickness of 62 feet.

There are no apparent geologic hazards in the tract.

References

- American Society for Testing and Materials, 1971, Standard specifications for classification of coals by rank (ASTM Designation D 388-66) in gaseous fuel, coal and coke: pt. 19, p. 59.
- Matson, R. E., Blumer, J. W., and Wegelin, L. A., 1973, Quality and reserves of strippable coal, selected deposits, southeastern Montana: Montana Bureau of Mines and Geology Bulletin 91, 135 p.

POTENTIAL USE OF COAL: Feedstock for electrical power plant or
synfuel plant.

TRANSPORTATION:

	Mode	Distance to Transportation Link
Existing		
Being Developed		
Being Planned	Railroad	85 miles
None Planned		

MINABILITY:

Type of Mine: Surface mine using dragline or truck-shovel methods.

Estimated Recovery:

Based on current practices in the Powder River Basin coal region, a recovery factor of 90 percent is typical. However, this factor may or may not be achieved.

Estimated Annual Production:

Federal Uncommitted: 2.2 million tons

Total Tract: 7.9 million tons

Estimated Mine Life: 40 years

Estimated Surface Acres to be Mined Per Year:

Federal Uncommitted: 24

Total Tract: 90

Active, Inactive, and Abandoned Mines or Leases in Tract Vicinity:

The mines surrounding Colstrip are approximately 28 miles northwest of the tract.

MARKETABILITY

A single general expression of interest was received for the area. An overall rating of Class 2 was applied after considering the ratings for all the evaluation factors.

DEFINITIONS AND ASSUMPTIONS FOR THE NORTHWEST OTTER CREEK TRACT: see Attachment D.

DETERMINATION OF CLASSES
- Northwest Otter Creek -

Coal Quality

The BTU content fell in this tract is moderately high when compared to other Powder River Basin coals. Also the percentage of sulfur is very low in comparison; therefore, a Class 1 rating was applied for this evaluation factor.

Transportation

The tract is located approximately 85 miles from an established rail line. Therefore, a Class 3 rating was applied.

Minability

In general the tract has one relatively thick seam and a maximum stripping ratio which is comparable to operating mines in the Basin. Bypass situations in sections 4 and 4 adversely affect the tract's overall minability. A Class 2 rating has, therefore, been applied.

MINING ENGINEERING
DEFINITIONS AND ASSUMPTIONS
- Northwest Otter Creek -

Deductions from the in-place resource were made for buffer zones and high-wall reduction zones. A recovery factor of 90 percent was then applied to the minable resource to determine the recoverable resource.

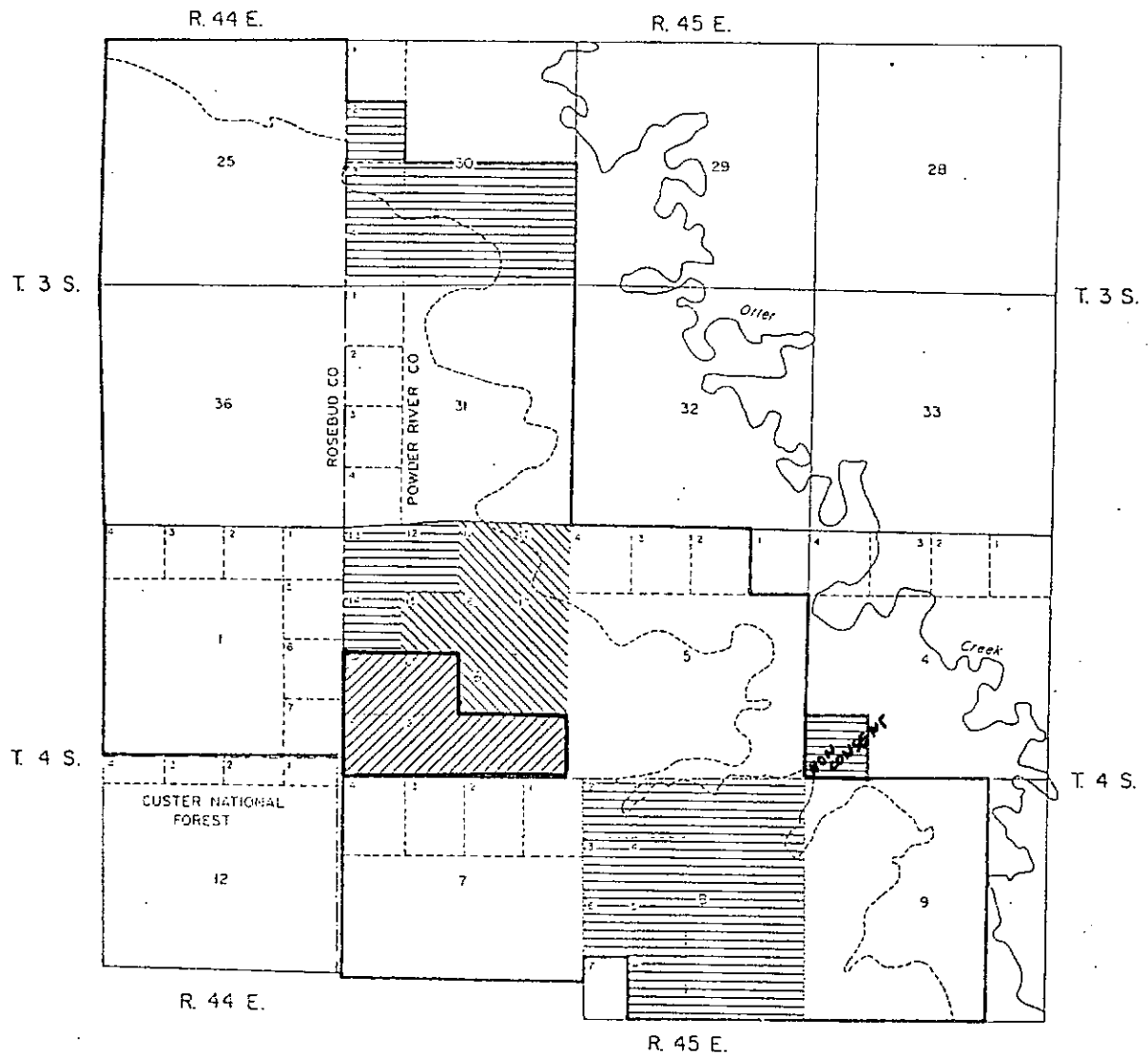
The rating for transportation was determined from the following table:

Rating	Distance to Established Transportation Link
Good	0-7 miles
Moderate	7-15 miles
Poor	15- miles

For a tract with more than one minable seam a weighted average proximate analysis was figured for the tract. The tract's proximate analysis was then compared to analyses from other marketed coals in the area for rating purposes.

NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

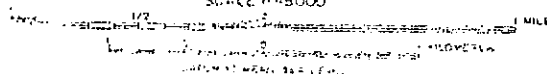
FIGURE 2



EXPLANATION

- PLMU BOUNDARY
- INFERRED OUTCROP OF KNOBLOCH BED
- GOLDEN EAGLE NEST
- FEDERAL COAL
- BYPASS COAL

SCALE 1:48000



MAXIMUM ECONOMIC RECOVERY
for
NORTHWEST OTTER CREEK TRACT

1982 Powder River Coal Lease Sale

December 15, 1981

Location

The tract is located in Powder River County, Montana, 4 miles southeast of Ashland, Montana. The Federal tract follows a checkerboard pattern with Burlington Northern and State-owned coal. A legal description of the Federal coal is as follows:

<u>T. 3 S., R. 45 E., P.M.M.</u>
Sec. 30: Lot 2, and S1/2.
<u>T. 4 S., R. 45 E., P.M.M.</u>
Sec. 4: SW1/4 SW1/4;
Sec. 6: Lots 10 to 17, inclusive, and N1/2 SE1/4;
Sec. 8: Lots 1 to 6, inclusive, lot 8, NE1/4, and SE1/4.

* A total of 1350 acres is included in the Federal tract.

Other Resources

There exists a little scoria within the area, but the deposit is not large enough to allow efficient or economic recovery.

Oil and gas resources are not known within the area. However, this area has been classified as being prospectively valuable for oil and gas. The nearest oil and gas production can be found in the Liscom Creek oil field and two other unnamed fields about 20-25 miles north of the area.

The area has also been classified as being prospectively valuable for sodium.

Geology

The 1350 acre tract lies near the northern margin of the Powder River Basin, where rocks of the Paleocene Fort Union Formation and the Eocene Wasatch Formation are widely distributed. Only the Tongue River member of the Fort Union contains significant coal beds in the area.

Rock strata composing the Tongue River member in the area are essentially flat lying. However, they do exhibit a regional southward dip of less than one degree.

* Indicates a change in acreage from the Tract Development Summary Report dated November 5, 1981. The acreage listed in this report is now accurate.

The Tongue River formation contains at least six persistent coal beds 5 to 35 feet thick, and several other thin, less persistent beds. One of the six beds is present within the boundaries of the tract and has a thickness as follows:

<u>Seam Identification</u>	<u>Coal Thickness (ft)</u>
Knobloch	62

Coal Reserves

The in-place reserve for the 1350 acre tract is 154 million tons of coal. This is based on the recovery of the Knobloch seam up to 300 feet of cover, or a 6:1 foot to foot stripping ratio, whichever is less. Using a 90% recovery factor, the recoverable reserve is equal to 139 million tons of coal. In general, the overburden above the Knobloch over the entire 1350 acres averages 200 feet in thickness.

Coal Quality

The Knobloch coal has the following as-received characteristics:

% Moisture	27.34	% Volative Matter	28.94
% Ash	6.21	% Fixed Carbon	37.52
% Sulfur	.19	Btu/lb	8497

(Source: Matson and others, 1973)

This coal is classified as subbituminous C (ASTM, 1971, p. 59).

Surface Mining Considerations

A review of Montana operations with coal of a similar nature indicates a minimum mineable coal thickness of approximately 5 feet, a maximum economic stripping ratio of 6:1 (foot to foot), a maximum overburden depth of 300 feet, coal quality of 8000 Btu/lb or greater, and a maximum sulfur content of .75%.

All the recoverable coal of the Knobloch seam in this tract falls within the above criteria.

Mining Methods

The purpose of this report is not to require the successful lessee to use the method outlined in this report. Rather, its intention is to provide a "most probable" method of mining at this time, so that an economic evaluation can be performed to set the lease terms.

In the Powder River Basin of Montana and Wyoming, the shallowly buried coal seams of the Fort Union formation are very amenable to surface mining. Either a dragline, truck-shovel, or a combination of both operations may be used.

In general, a truck-shovel operation can achieve recovery at greater depths than dragline, because of the limited capacity of a dragline. However, Montana State law requires a final highwall reduction of 5h:1v (horizontal to vertical) ratio, making it more economical for a dragline operation in cover up to 250 feet. Montana State policy also requires an undisturbed 100' buffer zone within and along the perimeter of a coal lease.

Therefore, in order to satisfy both the 5h:1v highwall reduction and 100 foot buffer zone, an operator's coal recovery would have to stop a considerable distance from the lease boundary to allow enough room for benches and buffers. An operation using a dragline with truck-shovel assist uses fewer but higher benches than a straight truck-shovel, allowing more coal to be recovered at a cheaper cost.

To determine the optimum mix of surface mining systems for Maximum Economic Recovery (MER) would require a thorough economic analysis of the systems and designs which is beyond the scope of this report.

It is not technologically feasible to mine the Knobloch seam by underground methods at this time. The thickest coal currently being mined underground in the United States is 11 feet (Chironis, 1981). One company in Colorado is attempting to mine 28 feet of coal underground. However, that seam is 2000 to 3000 feet below the surface, providing minimal surface disturbance (Chironis, 1981). The Knobloch, on the other hand, is 62 feet thick beneath less than 300 feet of cover. Even if the Knobloch was technologically feasible to mine underground, an average of only 50% of the resource could be recovered (U.S. Department of Interior, 1977, p.I-50).

In order to attain MER of this 1350 acre tract, the area should be surface mined in conjunction with the private coal in the tract, using a dragline with truck-shovel assist (see figures 2 & 3).

Conclusion

Prior to mining, the successful bidder will be required to submit a complete mining plan which demonstrates MER.

At this time, it appears that MER can be achieved by mining the Knobloch seam through the use of a dragline with truck-shovel assist in conjunction with the private coal in the tract. There are no readily evident alternatives to the mining methods discussed.

The maximum recoverable tonnage from this 1350 acre tract is 139 million tons.

REFERENCES CITED

American Society for Testing and Materials, 1971, Standard specifications for classification of coals by rank (ASTM Designation D 388-66) in gaseous fuels, coal, and coake: pt. 19, p. 59.

Chironis, N. P., 1981, Research and development projects paying off in 1981: Coal Age, v. 86, no. 2, p. 74-94.

Decker Coal Company, 1981, North Decker 5-year permit application.

Divide Coal Mining Company, 1977, Mining and reclamation plan, submitted to the U.S. Geological Survey to satisfy 30 CFR 211 regulations.

Matson, R.E., Blumer, J.W., and Wegelin, L.A., 1973, Quality and reserves of strippable coal, selected deposits, southeastern Montana: Montana Bureau of Mines and Geology Bulletin 91, 135p.

U.S. Department of Interior, 1977, Final environmental impact statement, proposed Federal leasing program: I-49.

_____, 1981, Final Powder River regional coal environmental impact statement: Bureau of Land Management.

U.S. Geological Survey, 1980, Engineering report for Duck Nest Creek, Wyoming: District Mining Office, Casper, Wyoming.

Woodruff, E.G., 1909, The Red Lodge coal field, Montana: US. Geological Survey Bulletin 341, p. 92-107.

TABLE 1 --Selected proximate analyses for coal producing regions, Montana and Wyoming

Parameter	Coal producing region/coal seam analyzed						
	Tongue River, Montana/ Sawyer	Tongue River, Montana/ Knobloch	Decker, Montana/ Dietz-1 ²	Colstrip, Montana/ Rosebud	Roundup, Montana/ Mammoth	Bear Creek, Montana/ No. 2	Gillette, Wyoming/ Wyodak
Thickness (feet)	10 - 15	50-70	50	25	7 - 9	8	75
Coal quality:							
Btu/lb (as received)	7,915	8,246	9,733	8,920	10,510	11,194	8,400
Sulfur (percent)	.35	.14	.42	.99	.60	1.44	.35
Ash (percent)	4.8	4.91	4.13	8.4	5.7	6.0	5.0
Moisture (percent)	32.25	30.00	23.63	23.10	16.90	10.03	28.00
Fixed carbon (percent)	33.8	37.1	39.0	49.1	44.6	46.7	34.0
Volatile matter (percent)	29.15	28.01	33.22	28.40	32.20	37.22	33.00
Mining method	Surface	Surface	Surface	Surface	Surface and underground	Underground	Surface

¹Matson and others, 1973.

²Decker Coal Company, 1981.

³Divide Coal Mining Company, 1977.

⁴Woodruff, 1969.

⁵U.S. Geological Survey, 1980a.

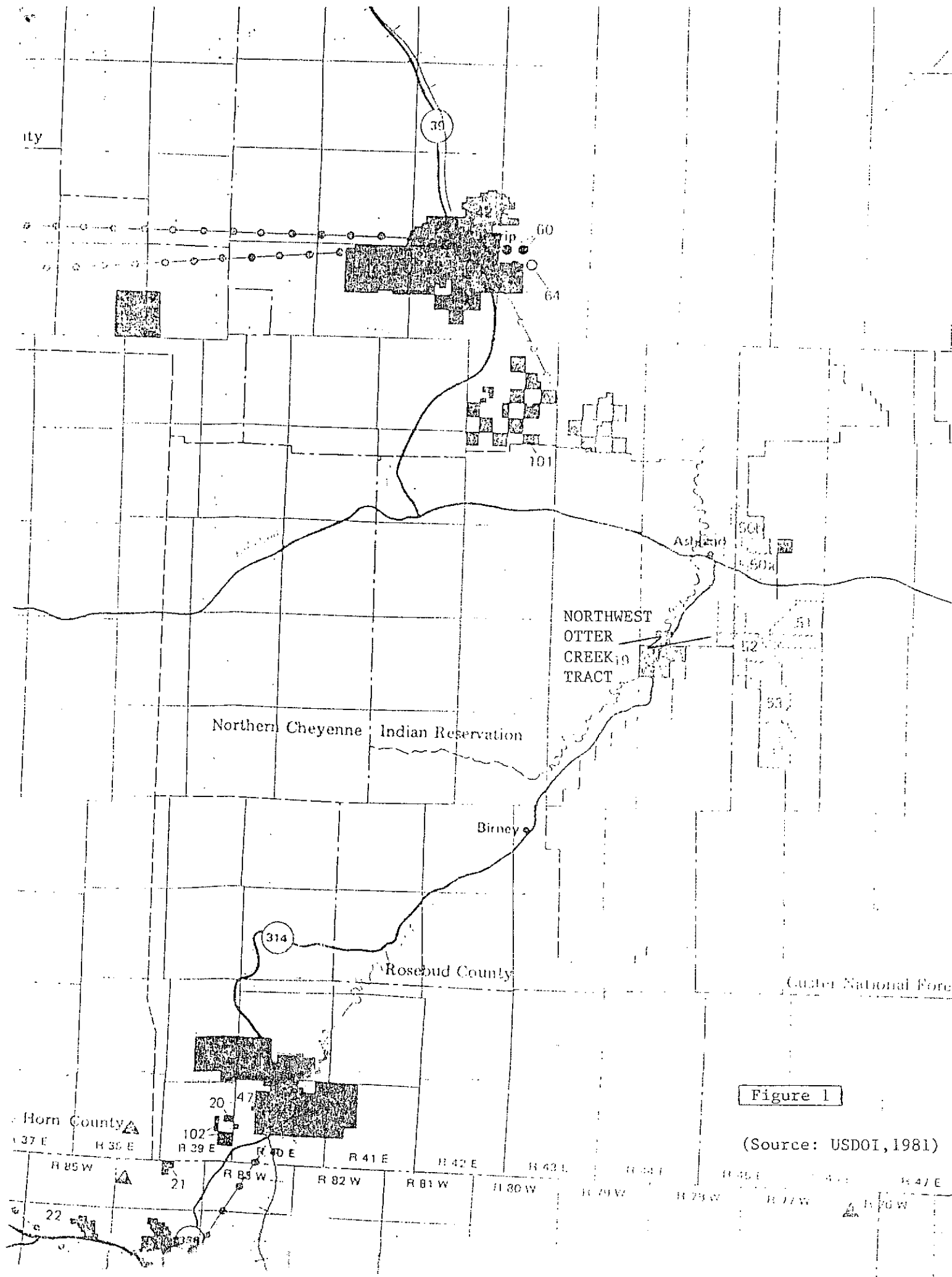
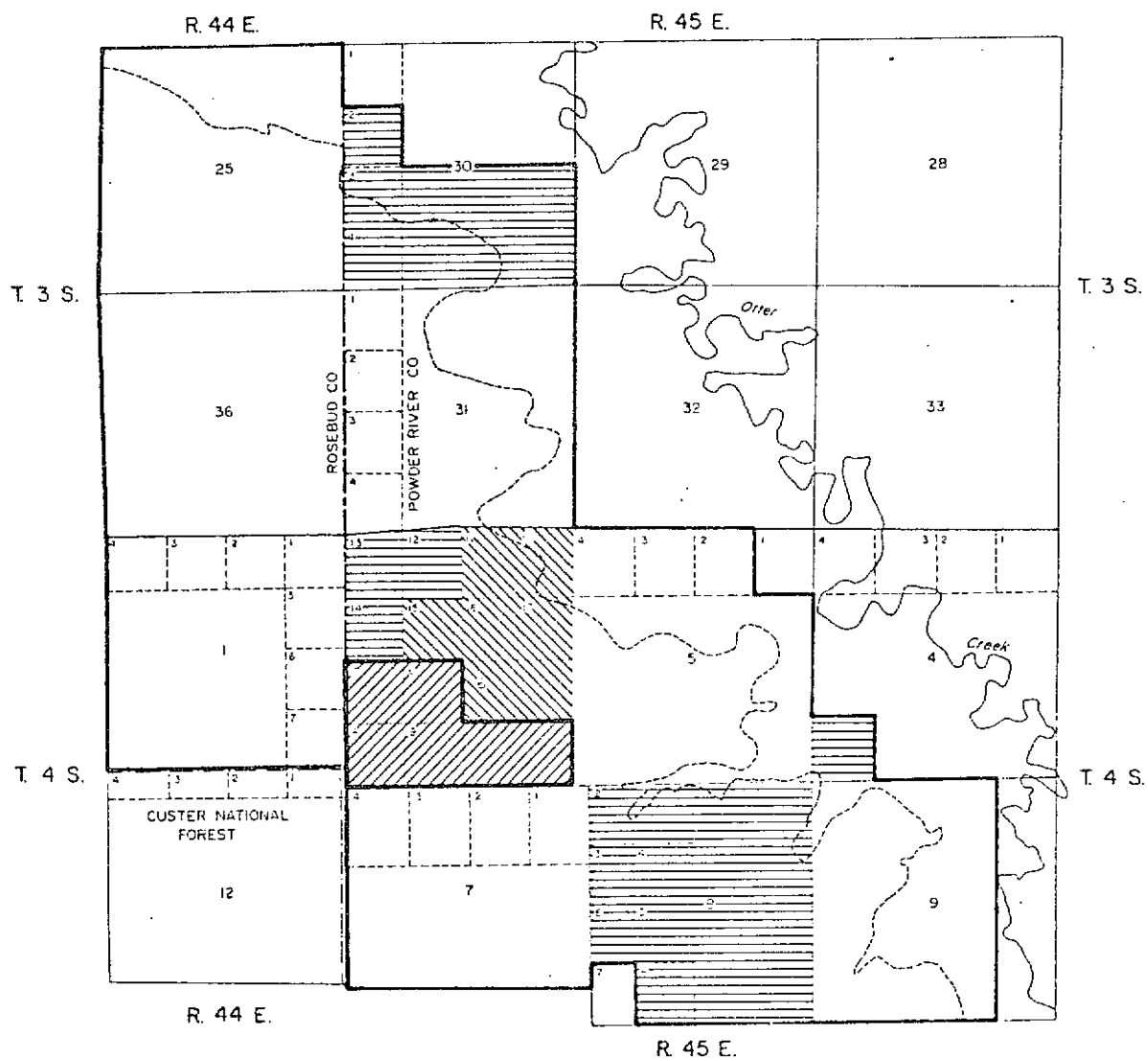


Figure 1






(Source: USDOI, 1981)

NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

FIGURE 2



EXPLANATION

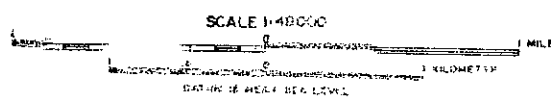
-  PLMU BOUNDARY
-  INFERRED OUTCROP OF KNOBLOCH BED
-  GOLDEN EAGLE NEST
-  FEDERAL COAL
-  BYPASS COAL

SCALE 1:48000

1 MILE

3
2
1
0
KILOMETER
500 FT. MEAN SEA LEVEL

FIGURE 3



TRACT DEVELOPMENT SUMMARY REPORT

November 5, 1981

A. Basic Data and Evaluation Assumptions

1. Tract Number: Northwest Otter Creek
2. Type of Leasing Action (Competitive/PRLA): Competitive
3. Tract Location: Four miles southeast of Ashland, Montana in Powder River and Big Horn Counties. See table 1 and figures 1 and 2.

-
4. Total Tract Acreage: 5435 acres (total tract)
1311 acres (unleased Federal)
3484 acres (Private)
640 acres (State)

5. Mining Method:
 - a. Stripping (dragline casting, truck shovel, etc. - if applicable) Dragline w/truck-shovel assist
 - b. Coal Production (surface or underground: longwall, continuous, or conventional) Surface

6. Mine Life Schedule (years):
 - a. Pre-Development 1
 - b. Development 2
 - c. Production 40
 - d. Post-Production 2

7. Annual Production Rate: 10.3 million tons/year

8. Movable Reserves by Seam:

Ownership	Seam Identification	Average Thickness	Recoverable Reserves($\times 10^6$ tons)
a. <u>unleased Federal</u>	<u>Knobloch</u>	<u>62'</u>	<u>139</u>
b. <u>Private</u>	<u>Knobloch</u>	<u>62'</u>	<u>210</u>
c. <u>State</u>	<u>Knobloch</u>	<u>62'</u>	<u>62</u>

9. Thickness of Partings Between Seams:

Parting Identification	Thickness
a. <u>None</u>	<u></u>
b. <u></u>	<u></u>
c. <u></u>	<u></u>
d. <u></u>	<u></u>

10. Overburden Thickness:

	Entire Tract	Unleased Federal
Minimum	0'	50'
Maximum	300'	300'
Average	175'	175'
Design (dragline maximum)	160'	160'

11. Coal Preparation Required (Yes/No):

Yes

12. Anticipated Coal Price (\$/Ton):

\$10

13. Anticipated Coal Market:

Pacific Northwest and/or Export

14. Anticipated End Usage (Steam/Met):

Steam

B. Mining Plan

- Discussion on How Mining Will Proceed: Mining will begin along the burn-
line with a boxcut in the northeast edge of the tract. Mining will then
proceed southwestward toward higher cover until the stripping limit or
National Forest is reached. See figure 2.

- Topographic map with original contours. See figure 2.

- Topographic map should illustrate: See figure 2.

- Tract boundaries;
- Plant location and facilities;

- c. Roads and railway spurs;
- d. Stream diversion dams;
- e. Location of original cut or entry and direction in which mining will proceed; and
- f. Outline of minable reserves.

4. General discussion on the following items:

- a. Plant facilities and location: SE 1/4, Sec. 32. See figure 2.

- b. Roads and railway spurs: A rail spur could be constructed from Ashland to the tract along the Otter Creek drainage if the Tongue River Railroad (T.R.R.) is built between Miles City and Ashland, Montana.

5. Coal and overburden characteristics:

a. Coal density	<u>1770 tons/ac-ft</u>
b. Overburden density	<u>1.8-1.9 g/cc</u>
c. Highwall angle	<u>65°</u>
d. Spoil angle (angle of repose)	<u>38°</u>
e. Swell factor	<u>25%</u>
f. Estimated coal recovery factor	<u>90%</u>
g. Average coal haul distance (first seven years of production)	<u>1 mile</u>

C. Roads and Railroad Spurs

- 1. Miles of access roads from nearest highway to mine site: 1/2 mile
- 2. Miles of railroad spur required from nearest railroad: 5 miles (provided T.R.R is built)

3. Miles of mine site roads

- a. Main haulage road (surface road): _____
- b. Roads connecting mine facilities: _____ None _____

D. Underground Mining

1. Number of entries in Main Entry System: _____
2. Type of main access (shaft, slope, drift): _____
3. Type of main haulage (belt/truck): _____

E. Supplementary Evaluation Information

1. Operating shifts per week:
- a. Stripping operations _____ 21 _____
- b. Overburden blasting _____ 5 _____
- c. Coal drilling, blasting, and loading _____ 5 _____
- d. Coal preparation _____ 10 _____
- e. Reclamation _____ 3 _____
2. Operating weeks per year: _____ 52 _____
3. Other
- a. Average topsoil depth in feet: _____ Unknown _____
- b. Average one-way haul distance for topsoil handling: _____ Unknown _____
- c. Linear footage of fencing required annually to protect revegetation: _____ Unknown _____
- d. Linear footage of diversion dams: _____ Unknown _____
- e. Cubic yards of dams: _____ Unknown _____
- f. Cubic yards of basins: _____ Unknown _____
- g. Distance to nearest utility voltage lines: _____

22 miles at Colstrip, Montana
(Unless lines come into Ashland,
5 miles away for proposed Montco Mine)

TABLE 1
LEGAL DESCRIPTION
OF NORTHWEST OTTER CREEK
PRELIMINARY LOGICAL MINING UNIT

T. 3 S., R. 44 E., P.M.M.,

Sec. 25: All,
Sec. 36: All.

T. 3 S., R. 45 E., P.M.M.,

* Sec. 30: SW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$,
Sec. 31: All.

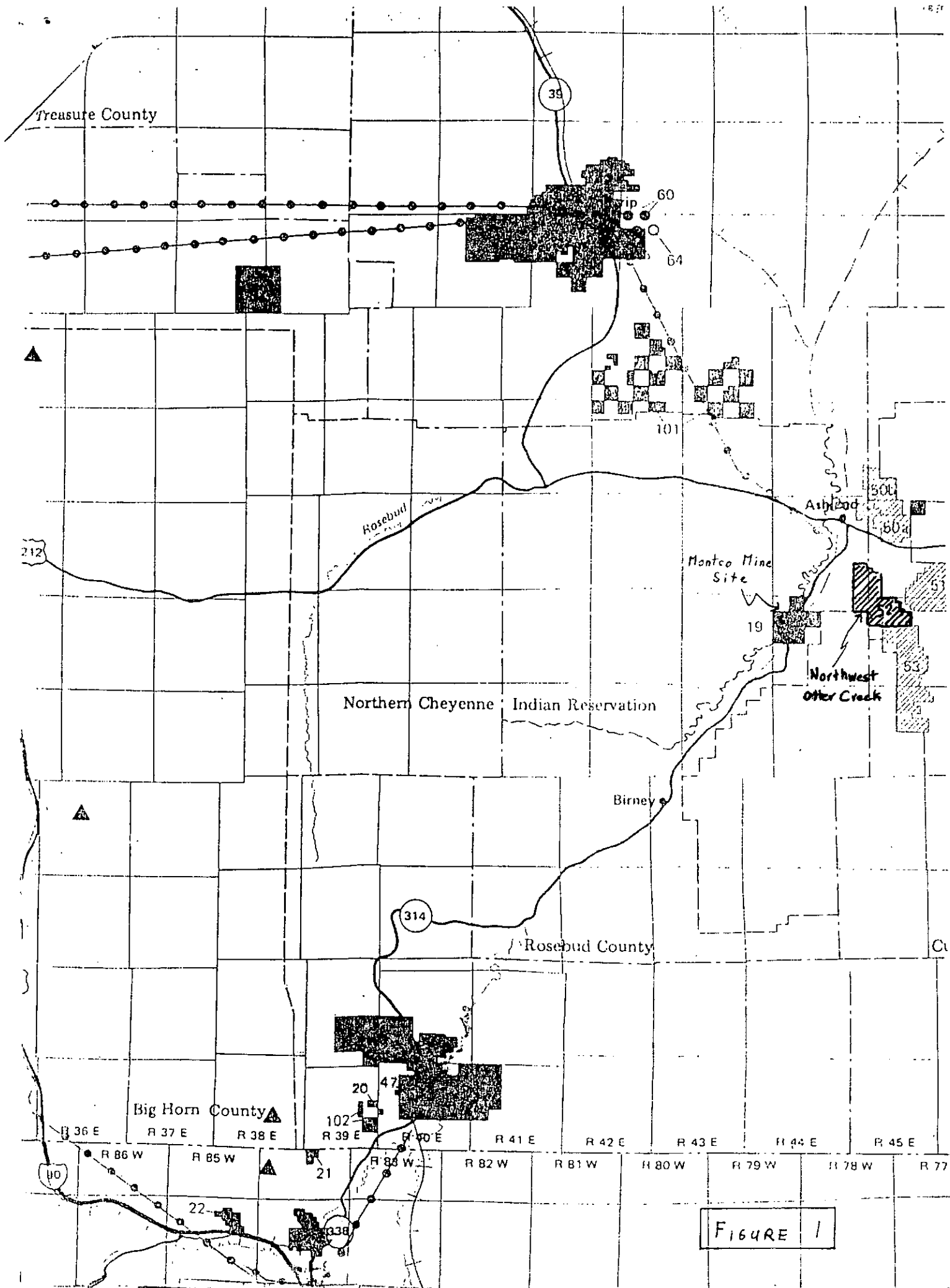
T. 4 S., R. 44 E., P.M.M.,

Sec. 1: All.

T. 4 S., R. 45 E., P.M.M.,

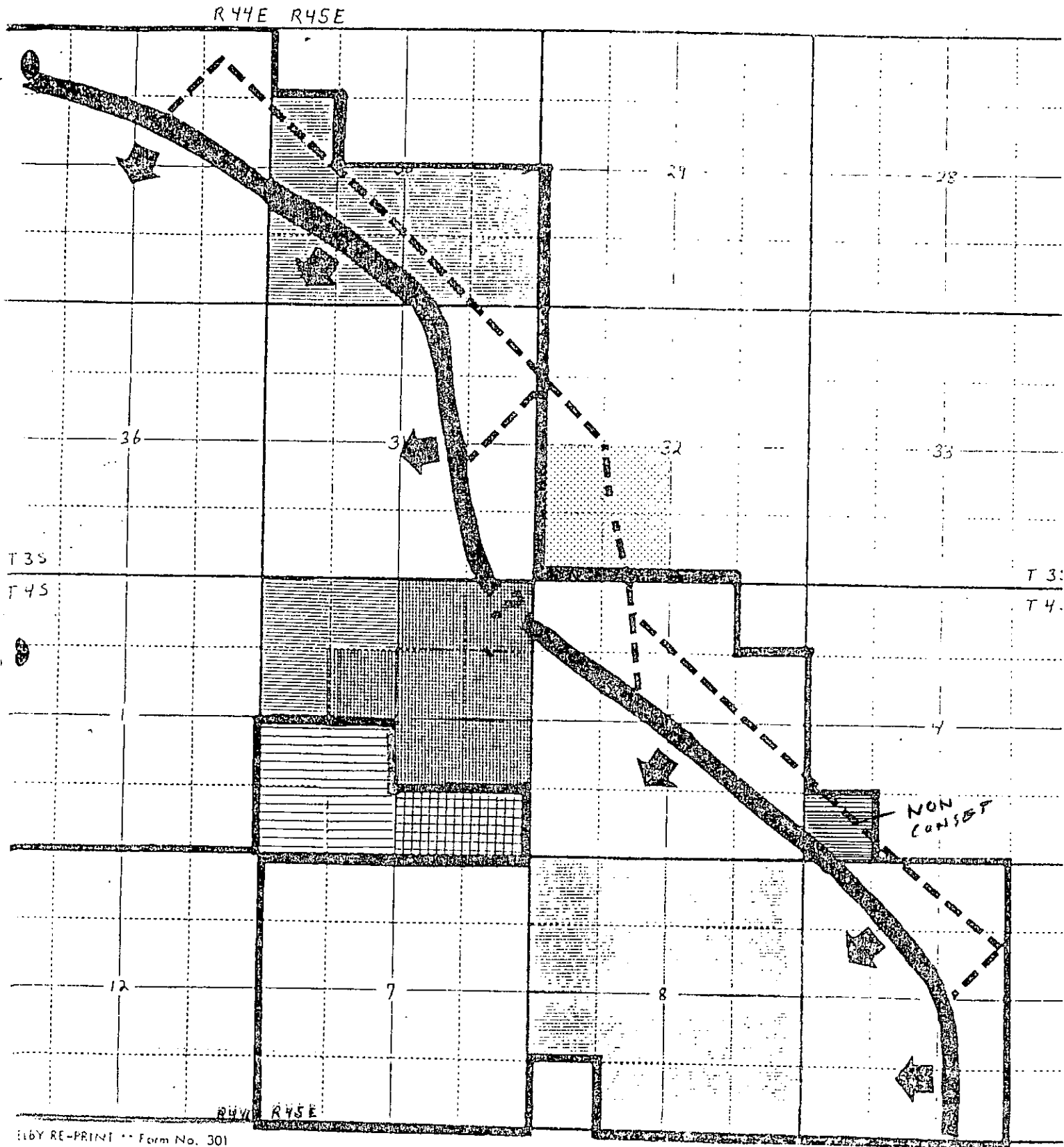
* Sec. 4: SW $\frac{1}{4}$ SW $\frac{1}{4}$,
Sec. 5: W $\frac{1}{2}$, SE $\frac{1}{4}$, W $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$,
* Sec. 6: N $\frac{1}{2}$, N $\frac{1}{2}$ SE $\frac{1}{4}$,
Sec. 7: All,
* Sec. 8: N $\frac{1}{2}$, N $\frac{1}{2}$ S $\frac{1}{2}$, S $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$,
Sec. 9: W $\frac{1}{2}$, W $\frac{1}{2}$ E $\frac{1}{2}$.

* Indicates Federal coal.



NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

Figure 2



ELBY RE-PRINT ** Form No. 301



- POSSIBLE BOX CUT WITH
DIRECTION OF ADVANCE



- PLMU BOUNDARY



- FEDERAL COAL



- GOLDEN EAGLE NEST



- MODERATE POTENTIAL
COAL BYPASS



- HIGH POTENTIAL COAL
BYPASS



- MINE FACILITIES

- OUT-OF-PIT Haul

ROADS

Scale: 2 inches = 1 mile

TRACT DELINEATION REPORT
NORTHWEST OTTER CREEK
PRELIMINARY LOGICAL MINING UNIT
Northern Powder River Basin, Montana
(Section B - Mining Engineering)

1. TYPE OF MINE -

- (a) Surface dragline with truck-shovel assist

Even the largest draglines in use today in western surface mines cannot move more than 150 feet of overburden alone. Where the thickness and quality of the coal merit deeper recovery, high cover is removed prior to dragline stripping with a combination of trucks, shovels, and scrapers.

- (b) Percent recovery - 90%

2. LOCATION OF OPERATION - T. 3 S. - 4 S., R. 44 E. - 45 E., P.M.M.
approximately 3 - 4 miles SSE of Ashland, Montana
(See Figures 1 and 2, and Table 1).

3. PRODUCTION RATE - 10.3 million tons/year

Mine life - 40 years

4. POTENTIAL OR EXPECTED USE OF COAL - Steam- electric generation -

The reserves could also support a synfuel plant.

5. ACRES DISTURBED PER YEAR BY MINING -

$$\frac{5,569 \text{ acres}}{40 \text{ years}} = 139.23 \text{ acres/year}$$

6. ACRES DISTURBED FOR LIFE OF MINE - 5,569 acres

7. PROJECTED ACRES DISTURBED FOR LIFE OF MINE BY FACILITIES AND
HAUL ROADS (See Figure 2).

Facilities - 160 acres

Haul Roads - 65 acres

8. PROJECTED EMPLOYMENT - 100 during first 2 - 3 years of construction,
- 275 during maximum production period of
10.5 million tons

9. PROBABLE TRANSPORTATION METHOD - The most likely means of transporting the coal to the consumer would be via a 3-mile long spur line of the proposed Tongue River Railroad (TRR). The TRR has been proposed to run from Birney to Miles City, Montana, where it would connect with established Burlington Northern lines. It should be completed by the time a mine would open up in the Northwest Otter Creek PLMU.
10. ELECTRIC REQUIREMENTS - The typical power requirement for existing mines in the area is 20 mw. Both Colstrip and Decker are serviced by 230 kv lines. A line would have to extend the 33 miles from Colstrip or 44 miles from Decker, Montana. Because the proposed Nance mine, on private coal northeast of Birney, Montana may be in production before the Northwest field is developed, it is possible that these power lines will already extend from Colstrip or Decker.
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Knobloch Seam Average Thickness - 62 feet

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% Moisture	27.34	% Volative Matter	28.94
% Ash	6.21	% Fixed Carbon	37.52
% Sulphur	.19	Btu/lb	8497

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OF \$10/ton

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- (d) Assuming 33.7% of yearly production is from Federal, and 15.1% is from State of Montana and 51.1% from private coal...

(1) Federal royalty:
 $((10,300,000 \text{ tons/yr} \times 33.7\%) \times \$10/\text{ton}) \times 12.5\% \text{ royalty}$
 $= \underline{\$4,338,875} \text{ Federal Royalty/year}$

(2) State royalty
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 $= \underline{\$1,944,125} \text{ State Royalty/year}$

(3) Fee royalty
 $((10,300,000 \text{ tons/yr} \times 51.1\%) \times \$10/\text{ton}) \times 12.5\% \text{ royalty}$
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19. FEASIBILITY FOR SMALL BUSINESS SET ASIDE -

Low: There were no small business expressions of interest for this coal field. Furthermore, the coal is deep enough to require large amounts of capital to open a mine, which a small business would not have.

20. REMARKS - This tract was developed before the effects were known of the vacant golden eagle's nest in sec. 6, T. 4 S., R. 45 E. on recovery of the coal. Therefore, the nest and buffer zone were included in the PLMU. A future meeting between USGS, USFWS, and BLM may in fact delete this 296 acres from the PLMU. If this happens, 30 million tons of recoverable coal will be lost from the PLMU. As can be seen in Figure 2, this also will split the mining sequence in half and will require a reevaluation of the Northwest and possibly Southwest Otter Creek PLMUs.

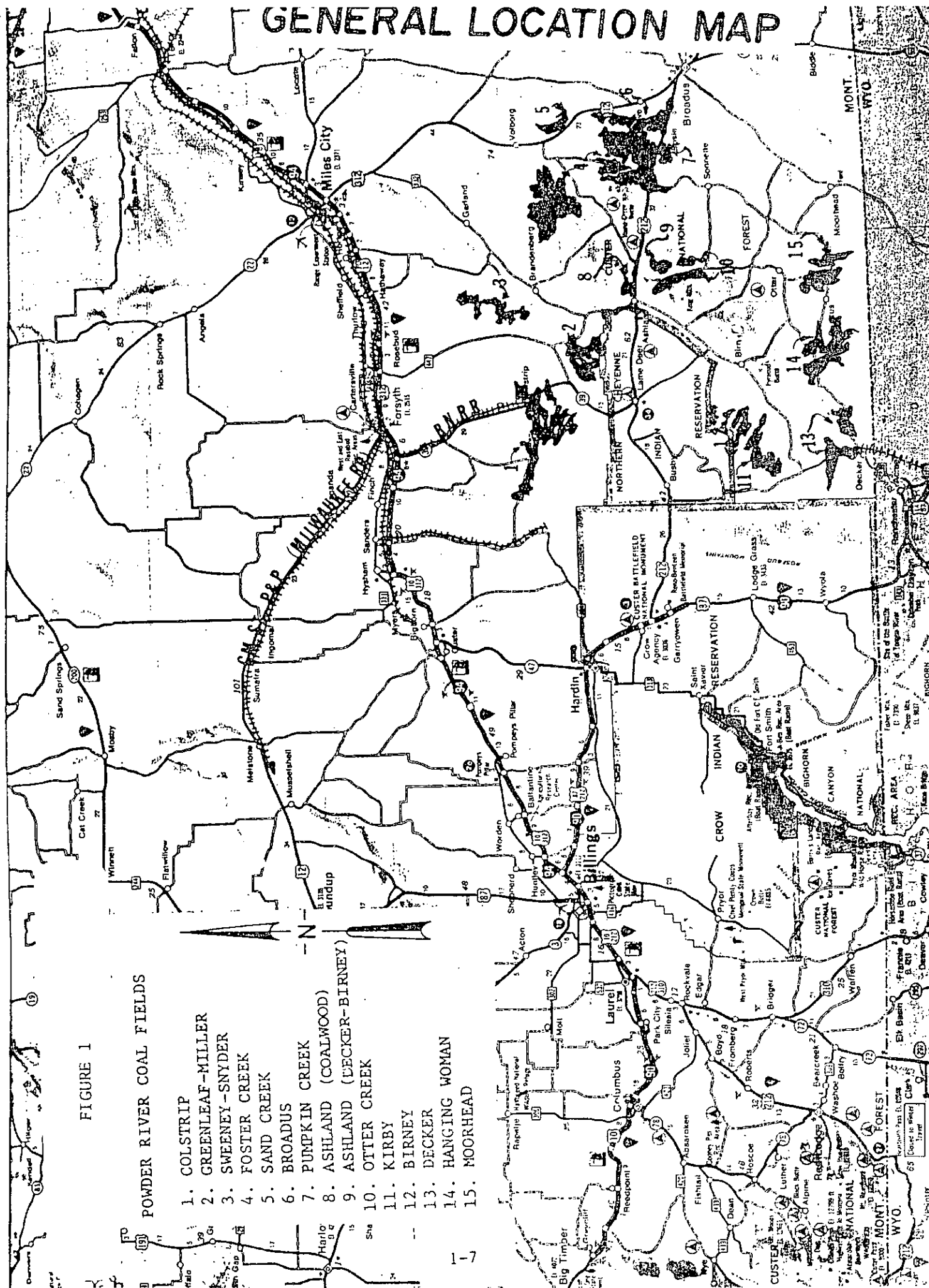
William B. Hansen
Mining Engineer, U.S.G.S.
October 14, 1980

GENERAL LOCATION MAP

FIGURE 1

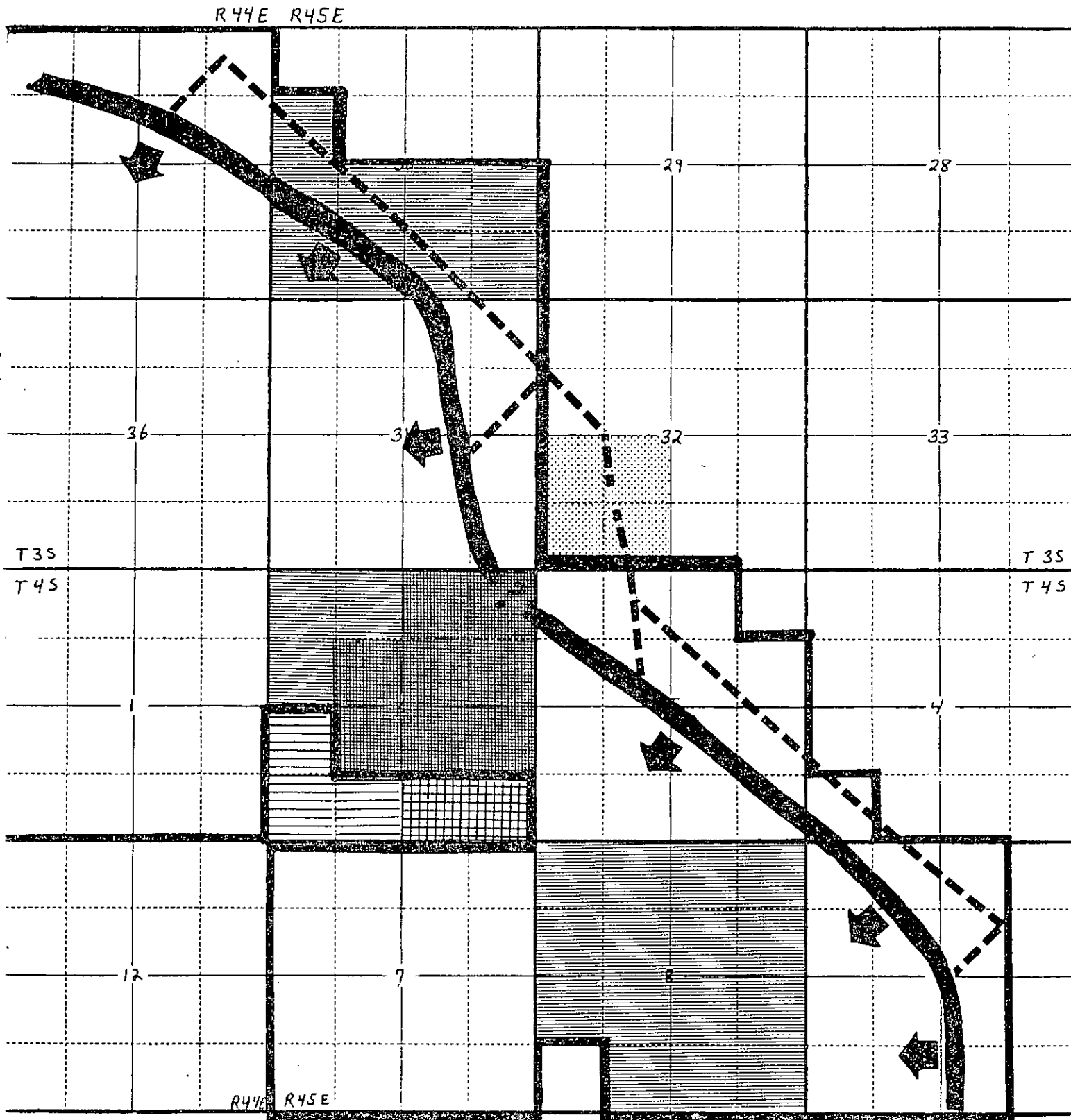
POWDER RIVER COAL FIELDS

1. COLSTRIP
2. GREENLEAF-MILLER
3. SWEENEY-SNYDER
4. FOSTER CREEK
5. SAND CREEK
6. BROADUS
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15. MOORHEAD



NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

Figure 2



SELBY RE-PRINT ** Form No. 301



- POSSIBLE BOX CUT WITH
DIRECTION OF ADVANCE



- PLMU BOUNDARY



- FEDERAL COAL



- GOLDEN EAGLE NEST



- MODERATE POTENTIAL
COAL BYPASS



- HIGH POTENTIAL COAL
BYPASS



- MINE FACILITIES

Scale: 2 inches = 1 mile

TABLE 1
LEGAL DESCRIPTION
OF NORTHWEST OTTER CREEK
Preliminary Logical Mining Unit

T. 3 S., R. 44 E., P.M.M.

Sec. 25: All

Sec. 36: All

T. 3 S., R. 45 E., P.M.M.

*Sec. 30: $SW\frac{1}{4}NW\frac{1}{4}$, $S\frac{1}{2}$

Sec. 31: All

T. 4 S., R. 44 E., P.M.M.

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T. 4 S., R. 45 E., P.M.M.

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Sec. 5: $W\frac{1}{2}$, $SE\frac{1}{4}$, $W\frac{1}{2}NE\frac{1}{4}$, $SE\frac{1}{4}NE\frac{1}{4}$

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Sec. 7: All

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Sec. 9: $W\frac{1}{2}$, $W\frac{1}{2}E\frac{1}{2}$

* Indicates Federal coal.

NORTHWEST OTTER CREEK PLMU
SECTION C
Combined Geologist/Engineer Input

2. INDICATION OF THE COMPETITIVENESS OF THE TRACT:

Factors to consider - Two expressions of interest

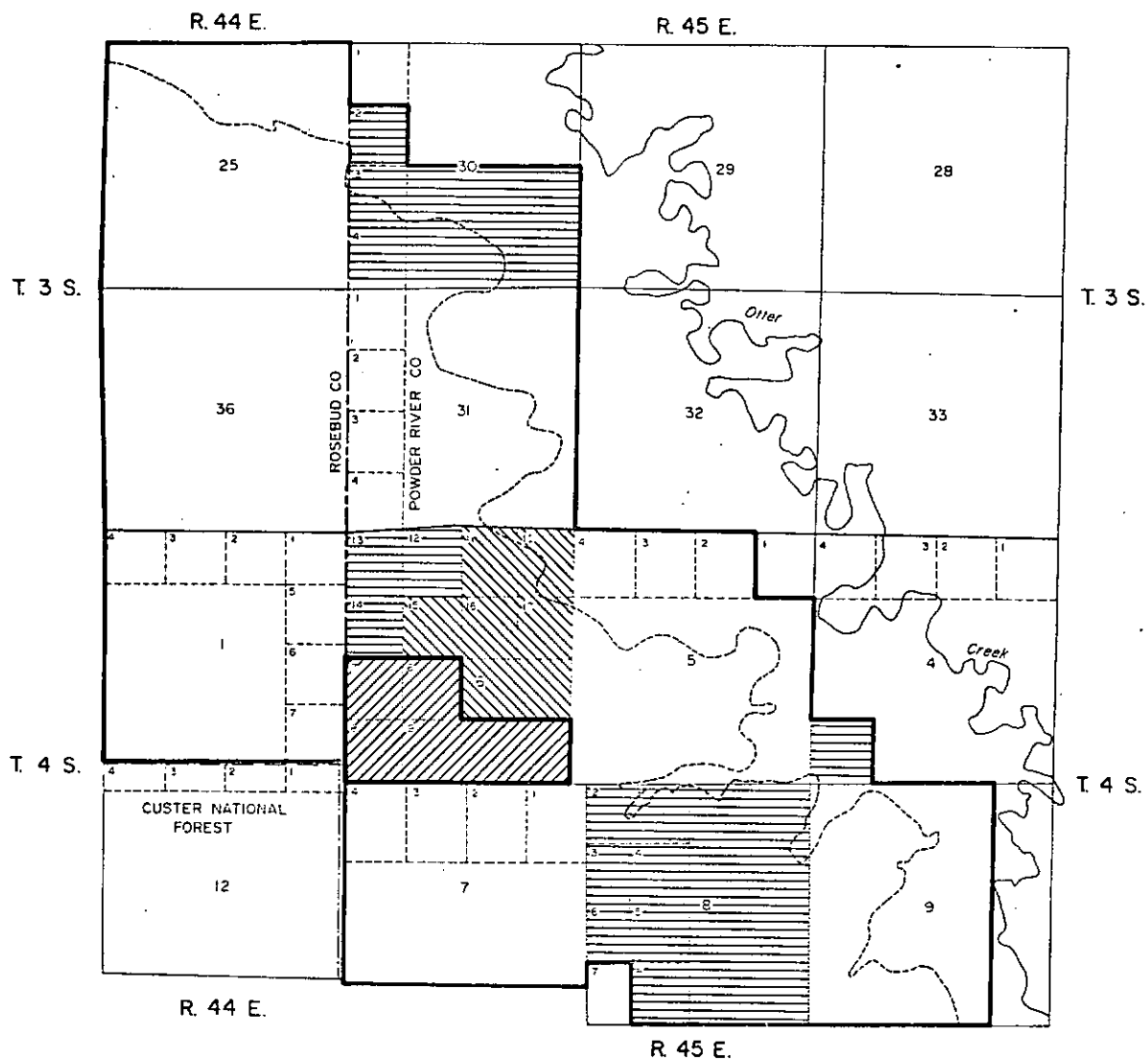
- At least three major coal companies have control of the surface in the PLMU and/or the private coal
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- Between 10 and 20 million tons of high and moderate potential coal is outside the Management Framework Plan Boundary and cannot be leased. This could create a future bypass situation.

Despite the disadvantages, competition for the PLMU will probably be excellent.

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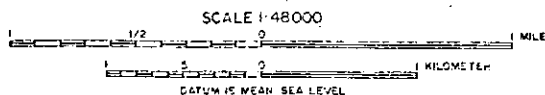
NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

FIGURE 2



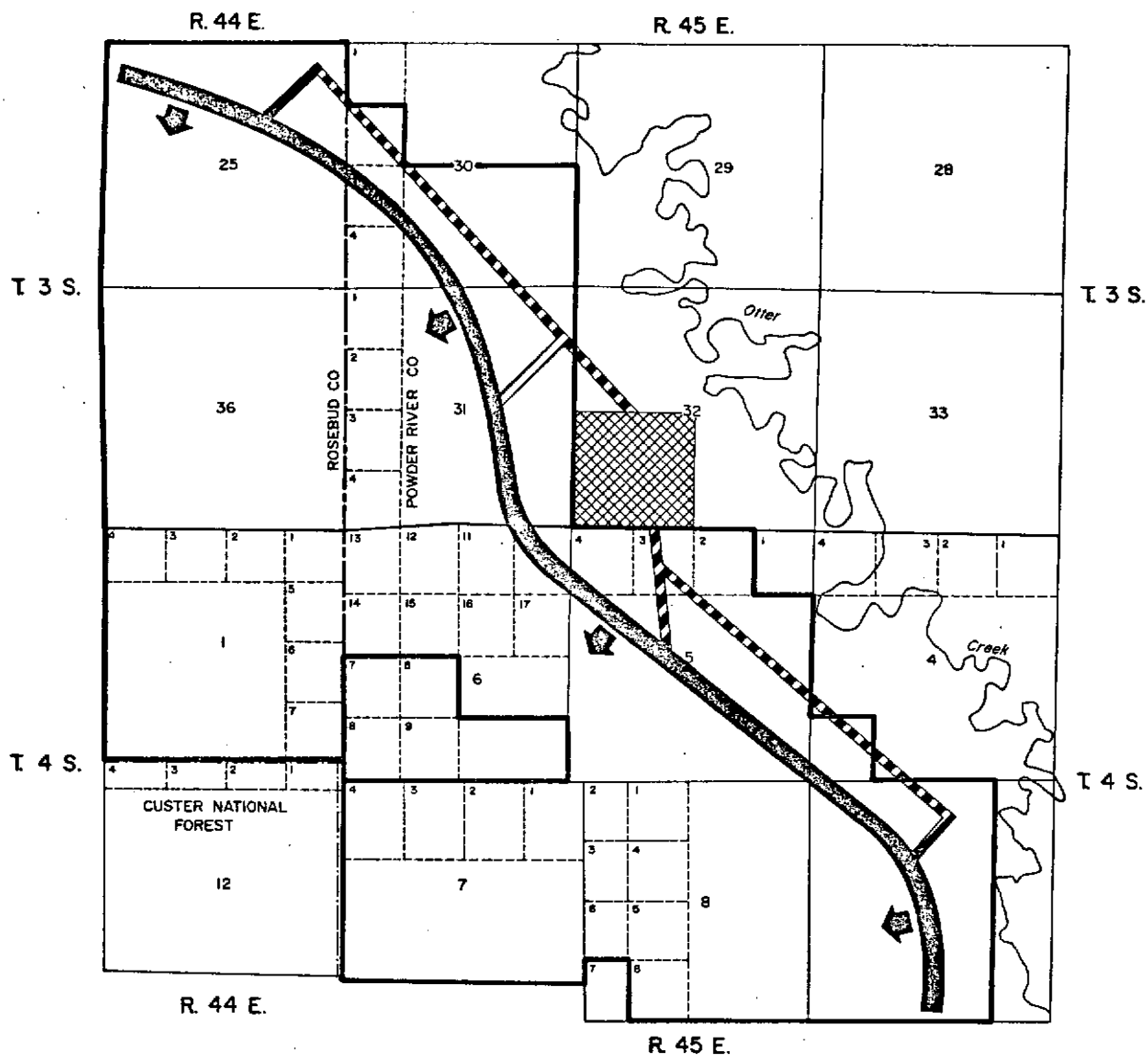
EXPLANATION

- PLMU BOUNDARY
- INFERRED OUTCROP OF KNOBLOCH BED
- GOLDEN EAGLE NEST
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- BYPASS COAL








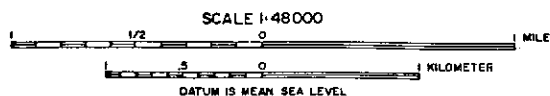
NORTHWEST OTTER CREEK PRELIMINARY LOGICAL MINING UNIT (PLMU)

FIGURE 3



EXPLANATION

-  PLMU BOUNDARY
-  POSSIBLE BOX CUT WITH DIRECTION
-  OF ADVANCE
-  OUT-OF-PIT HAUL ROADS
-  MINE FACILITIES



TRACT DELINEATION REPORT
NORTHWEST OTTER CREEK
PRELIMINARY LOGICAL MINING UNIT
Northern Powder River Basin, Montana
(Section B - Mining Engineering)

1. TYPE OF MINE -

- (a) Surface dragline with truck-shovel assist

Even the largest draglines in use today in western surface mines cannot move more than 150 feet of overburden alone. Where the thickness and quality of the coal merit deeper recovery, high cover is removed prior to dragline stripping with a combination of trucks, shovels, and scrapers.

- (b) Percent recovery - 90%

2. LOCATION OF OPERATION - T. 3 S.- 4 S., R. 44 E. - 45 E., P.M.M.
approximately 3 - 4 miles SSE of Ashland, Montana
(See Figures 1 and 2, and Table 1).

3. PRODUCTION RATE - 10.3 million tons/year

Mine life - 40 years

4. POTENTIAL OR EXPECTED USE OF COAL - Steam- electric generation -
The reserves could also support a synfuel plant.

5. ACRES DISTURBED PER YEAR BY MINING -

$$\frac{5,569 \text{ acres}}{40 \text{ years}} = 139.23 \text{ acres/year}$$

6. ACRES DISTURBED FOR LIFE OF MINE - 5,569 acres

7. PROJECTED ACRES DISTURBED FOR LIFE OF MINE BY FACILITIES AND
HAUL ROADS (See Figure 2).

Facilities - 160 acres

Haul Roads - 65 acres

8. PROJECTED EMPLOYMENT - 100 during first 2 - 3 years of construction,
- 275 during maximum production period of
10.5 million tons

9. PROBABLE TRANSPORTATION METHOD - The most likely means of transporting the coal to the consumer would be via a 3-mile long spur line of the proposed Tongue River Railroad (TRR). The TRR has been proposed to run from Birney to Miles City, Montana, where it would connect with established Burlington Northern lines. It should be completed by the time a mine would open up in the Northwest Otter Creek PLMU.
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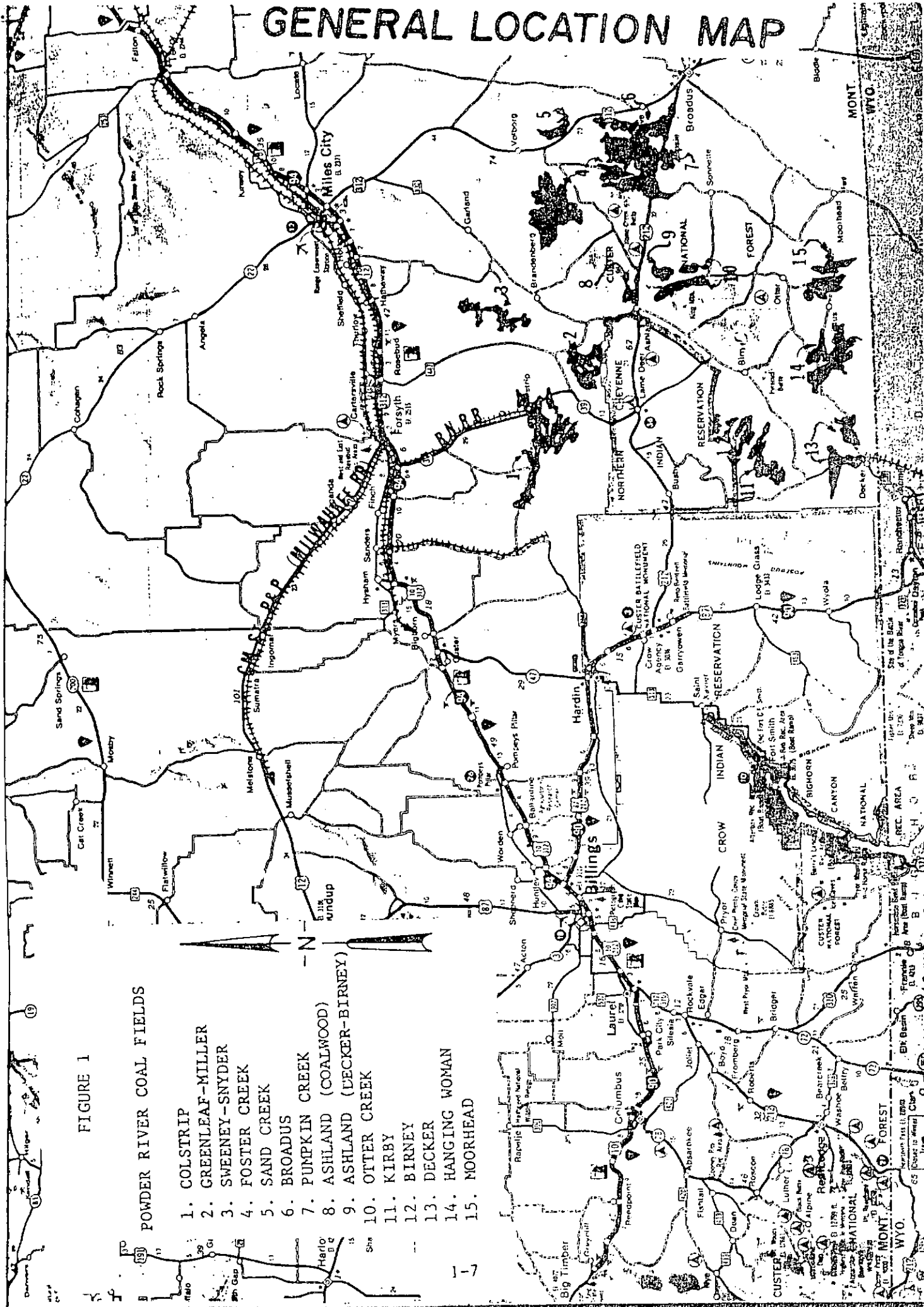
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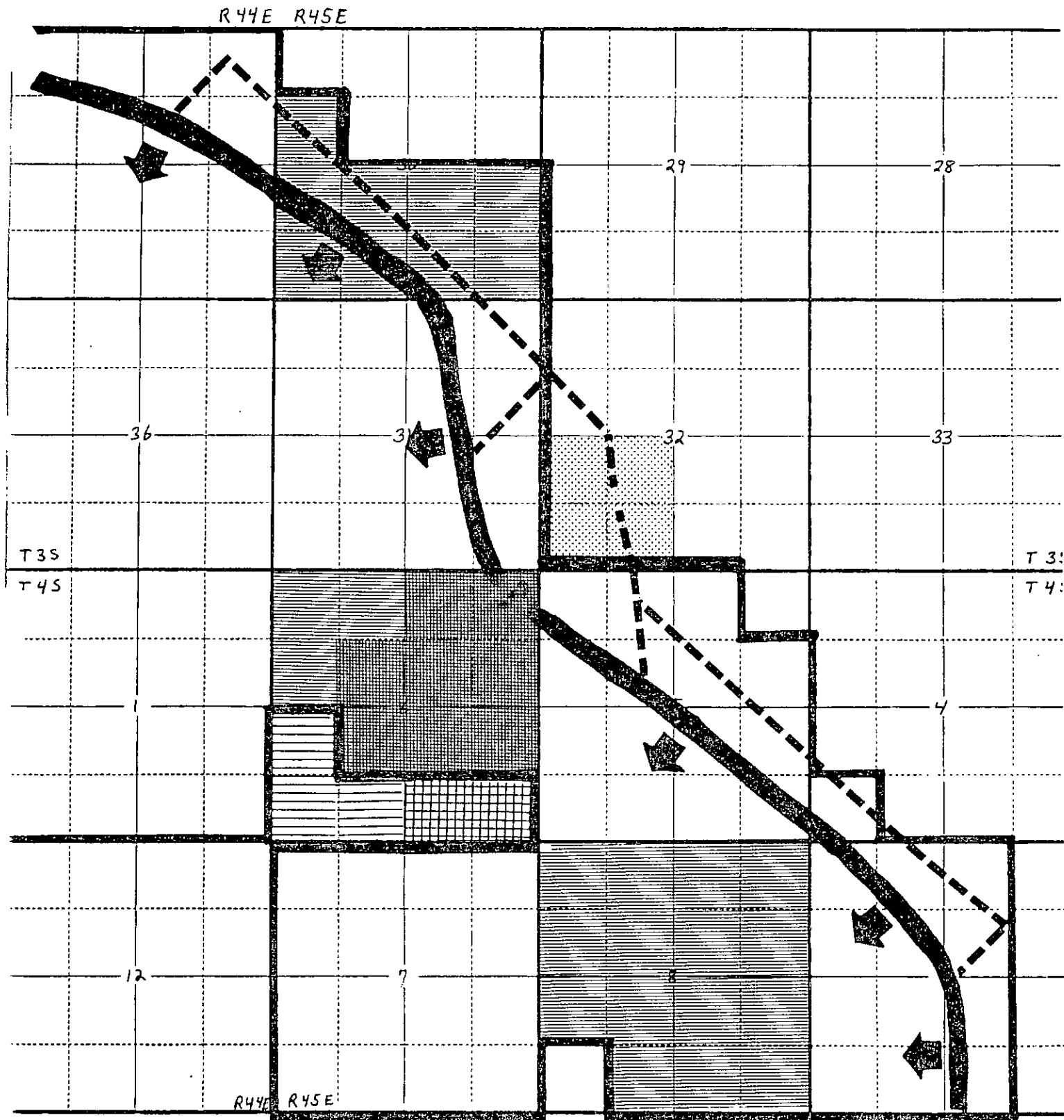
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SELBY RE-PRINT ** Form No. 301



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NORTHWEST OTTER CREEK PLMU
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